

Release notes for ENDF/B Development n-092_U_230
evaluation



April 26, 2017

- fudge-4.0 Warnings:

1. Cross section does not match sum of linked reaction cross sections
crossSectionSum label 0: total (Error # 0): CS Sum.

WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 1.09%
2. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 1 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
3. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 2 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [nubar]): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (8.541146e-09) is too small
4. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 3 (total): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
5. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 3 (total): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
6. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 4 (n + U230): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
7. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 4 (n + U230): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
8. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 6 (n[multiplicity:'2'] + U229 + gamma): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (5.838482e-09) is too small

9. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 0 (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
10. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 8 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission]): / Form 'eval': / Component 1 (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
11. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 9 (n + (U230_e1 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (6.379574e-09) is too small
12. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 10 (n + (U230_e2 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (3.179343e-09) is too small
13. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 11 (n + (U230_e3 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (6.435974e-09) is too small
14. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 12 (n + (U230_e4 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
15. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 13 (n + (U230_e5 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.
- WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
16. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 14 (n + (U230_e6 ->U230 + gamma)): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

17. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 15 ($n + (U230_e7 \rightarrow U230 + \text{gamma})$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (3.683769e-09) is too small

18. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 16 ($n + (U230_e8 \rightarrow U230 + \text{gamma})$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (1.573353e-12) is too small

19. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 17 ($n + (U230_c \rightarrow U230 + \text{gamma})$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

20. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 18 ($U231 + \text{gamma}$): / Form 'eval': / Component 0 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

21. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 18 ($U231 + \text{gamma}$): / Form 'eval': / Component 1 (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

22. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 19 ($n + U230$ [angular distribution]): / Form 'eval': (Error # 1): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

23. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 20 ($n[\text{multiplicity}:\text{'energyDependent'}, \text{emissionMode}:\text{'prompt'}] + n[\text{emissionMode}:\text{'delayed'}] + \text{gamma} [\text{total fission}] [\text{spectrum}]$): / Form 'eval': (Error # 0): Condition num.

WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small

24. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 21 ($n[\text{multiplicity}:\text{'energyDependent'}, \text{emissionMode}:\text{'prompt'}] + n[\text{emissionMode}:\text{'delayed'}] + \text{gamma} [\text{total fission}] [\text{spectrum}]$): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

25. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 22 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

26. The ratio of smallest/largest eigenvalue is quite small, possibly leading to numerical instability in downstream codes.
Section 23 (n[multiplicity:'energyDependent', emissionMode:'prompt'] + n[emissionMode:'1 delayed'] + gamma [total fission] [spectrum]): / Form 'eval': (Error # 0): Condition num.

```
WARNING: Ratio of smallest/largest eigenvalue (0.000000e+00) is too small
```

- fudge-4.0 Errors:

1. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_a / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

2. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Distribution: / uncorrelated - angular - isotropic: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (170000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (300000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (500000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

```
WARNING: Domain doesn't match the cross section domain: (700000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

```
... plus 7 more instances of this message
```

3. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_b / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (300000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

4. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_c / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (500000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

5. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_d / Multiplicity: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (700000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
```

6. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_e / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (700000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
7. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_f / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (560748.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
8. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_g / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (500000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
9. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_h / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (500000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
10. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_i / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (560748.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
11. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_j / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (900000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
12. Energy range of data set does not match cross section range
reaction label 9: n + (U230_c -> U230 + gamma) / Product: U230_c / Decay product: gamma_k / Multiplicity: (Error # 0): Domain mismatch (a)

WARNING: Domain doesn't match the cross section domain: (700000.0 -> 20000000.0) vs (110967.0 -> 20000000.0)
13. Calculated and tabulated Q values disagree.
reaction label 10: n[multiplicity:'2'] + U229 + gamma (Error # 0): Q mismatch

WARNING: Calculated and tabulated Q-values disagree: -7514829.069000244 eV vs -7667190. eV!
14. Calculated and tabulated Q values disagree.
reaction label 11: n[multiplicity:'3'] + U228 + gamma (Error # 0): Q mismatch

WARNING: Calculated and tabulated Q-values disagree: -13600263.60037231 eV vs -1.37526e7 eV!
15. Calculated and tabulated Q values disagree.
reaction label 13: U231 + gamma (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 6031019.288024902 eV vs 5878660. eV!
```

16. Multiplicity does not match sum of linked product multiplicities!
multiplicitySum label 11: n + (U230_c -> U230 + gamma) total gamma multiplicity (Error # 0): summedMultiplicityMismatch

```
WARNING: Multiplicity does not match sum of linked product multiplicities! Max diff: 33.49%
```

17. Calculated and tabulated Q values disagree.
fissionComponent label 0: /reactionSuite/fissionComponents/fissionComponent[@label='0'] (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 215214963242.7122 eV vs 1.901268e8 eV!
```

18. Calculated and tabulated Q values disagree.
fissionComponent label 1: /reactionSuite/fissionComponents/fissionComponent[@label='1'] (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 215214963242.7122 eV vs 1.901268e8 eV!
```

19. Calculated and tabulated Q values disagree.
fissionComponent label 2: /reactionSuite/fissionComponents/fissionComponent[@label='2'] (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 215214963242.7122 eV vs 1.901268e8 eV!
```

20. Calculated and tabulated Q values disagree.
fissionComponent label 3: /reactionSuite/fissionComponents/fissionComponent[@label='3'] (Error # 0): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 215214963242.7122 eV vs 1.901268e8 eV!
```

21. A covariance matrix was not positive semi-definite, so it has negative eigenvalues.
Section 19 (n + U230 [angular distribution]): / Form 'eval': / LegendreLValue L=1 vs 1 (Error # 0): Bad evs

```
WARNING: 10 negative eigenvalues! Worst case = -2.385225e-05
```

- njoy2012 Warnings:

1. Evaluation has no resonance parameters given
unresr...calculation of unresolved resonance cross sections (0): No RR

```
---message from unresr---mat 9213 has no resonance parameters
copy as is to nout
```

2. In some evaluations, the partial fission reactions MT=19, 20, 21, and 38 are given in File 3, but no corresponding distributions are given. In these cases, it is assumed that MT=18 should be used for the fission neutron distributions.
heatr...prompt kerma (0): HEATR/hinit (3)

```
---message from hinit---mt19 has no spectrum
mt18 spectrum will be used.
```

3. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (1): HEATR/hinit (4)

```
---message from hinit---mf6, mt 16 does not give recoil za= 92229
one-particle recoil approx. used.
```

4. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (2): HEATR/hinit (4)

```
---message from hinit---mf6, mt 17 does not give recoil za= 92228
one-particle recoil approx. used.
```

5. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (3): HEATR/hinit (4)

```
---message from hinit---mf6, mt 51 does not give recoil za= 92230
one-particle recoil approx. used.
```

6. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (4): HEATR/hinit (4)

```
---message from hinit---mf6, mt 52 does not give recoil za= 92230
one-particle recoil approx. used.
```

7. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (5): HEATR/hinit (4)

```
---message from hinit---mf6, mt 53 does not give recoil za= 92230
one-particle recoil approx. used.
```

8. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (6): HEATR/hinit (4)

```
---message from hinit---mf6, mt 54 does not give recoil za= 92230
one-particle recoil approx. used.
```

9. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (7): HEATR/hinit (4)

```
---message from hinit---mf6, mt 55 does not give recoil za= 92230
one-particle recoil approx. used.
```

10. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (8): HEATR/hinit (4)

```
---message from hinit---mf6, mt 56 does not give recoil za= 92230
one-particle recoil approx. used.
```

11. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (9): HEATR/hinit (4)

```
---message from hinit---mf6, mt 57 does not give recoil za= 92230
one-particle recoil approx. used.
```

12. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (10): HEATR/hinit (4)

```
---message from hinit---mf6, mt 58 does not give recoil za= 92230
one-particle recoil approx. used.
```

13. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (11): HEATR/hinit (4)

```
---message from hinit---mf6, mt 91 does not give recoil za= 92230
one-particle recoil approx. used.
```

14. Recoil is not given, so one-particle recoil approximation used.
heatr...prompt kerma (12): HEATR/hinit (4)

```
---message from hinit---mf6, mt102 does not give recoil za= 92231
photon momentum recoil used.
```

15. There is a problem with the fission energy release.
heatr...prompt kerma (13): HEATR/nheat (3)

```
---message from nheat---changed q from 1.901268E+08 to 1.804935E+08
for mt 18
```

16. Evaluation has no resonance parameters given
purr...probabalistic unresolved calculation (0): No RR

```
---message from purr---mat 9213 has no resonance parameters
copy as is to nout
```